

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CH2004/000511

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/53 C12N15/11 C12N9/02 C12N9/04 C12N15/63  
C12N1/21 C12P17/04 C12P7/60

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C12P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, EMBL, WPI Data, PAJ, BIOSIS, FSTA, Sequence Search

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|------------|--|-----------------------|
| X          | SAITO Y ET AL: "CLONING OF GENES CODING FOR L-SORBOSE AND L-SORBOSONE DEHYDROGENASES FROM GLUCONOBACTER OXYDANS AND MICROBIAL PRODUCTION OF 2-KETO-L-GULONATE, A PRECURSOR OF L-ASCORBIC ACID, IN A RECOMBINANT G. OXYDANS STRAIN" APPLIED AND ENVIRONMENTAL MICROBIOLOGY, WASHINGTON, DC, US, vol. 63, no. 2, 1997, pages 454-460, XP000886144 ISSN: 0099-2240 the whole document | 1-37                  |
| X          | EP 0 922 759 A (F. HOFFMANN-LA ROCHE AG) 16 June 1999 (1999-06-16) the whole document  | 1-37                  |
|            | -----<br>-/-   |                       |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

16 March 2005

Date of mailing of the international search report

12.07.2005

Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

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PCT/CH2004/000511

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|------------|--|-----------------------|
| X          | <p>DATABASE EMBL [Online]<br/> 18 December 2001 (2001-12-18),<br/> "Agrobacterium tumefaciens str. C58 linear<br/> chromosome, section 35 of 187 of the<br/> complete sequence."<br/> XP002321379<br/> retrieved from EBI accession no.<br/> EM PRO:AE009265<br/> Database accession no. AE009265<br/> the whole document</p>  | 1,4-7,12              |
| X          | <p>-----<br/> DATABASE UniProt [Online]<br/> 1 June 2003 (2003-06-01), "Glucose<br/> dehydrogenase."<br/> XP002321380<br/> retrieved from EBI accession no.<br/> UNIPROT:Q882Q7<br/> Database accession no. Q882Q7<br/> the whole document</p>   | 9                     |
| X          | <p>-----<br/> WO 97/04101 A (FRAUNHOFER-GESELLSCHAFT ZUR<br/> FOERDERUNG DER ANGEWAND; WISSLER, JOSEF;<br/> F) 6 February 1997 (1997-02-06)<br/> sequences 7,12,20</p>   | 9,10                  |
| A          | <p>-----<br/> WO 03/016508 A (CERESTAR HOLDING B.V; DE<br/> TROOSTEMBERGH, JEAN-CLAUDE, MARIE-PIERRE,<br/> GHI) 27 February 2003 (2003-02-27)<br/> claims 1-4; examples 1-7</p>  | 1-37                  |
| A          | <p>-----<br/> SUGISAWA T ET AL: "ISOLATION AND<br/> CHARACTERIZATION OF A NEW VITAMIN C<br/> PRODUCING ENZYME (L-GULONO-GAMMA-LACTONE<br/> DEHYDROGENASE) OF BACTERIAL ORIGIN"<br/> BIOSCIENCE, BIOTECHNOLOGY AND<br/> BIOCHEMISTRY, XX, XX,<br/> vol. 59, no. 2, February 1995 (1995-02),<br/> pages 190-196, XP001084987<br/> ISSN: 0916-8451<br/> page 191 - page 192</p> | 24-37                 |
| A          | <p>-----<br/> EP 0 911 415 A (F. HOFFMANN-LA ROCHE AG)<br/> 28 April 1999 (1999-04-28)<br/> the whole document</p> <p>-----<br/> -/--</p>  | 24-37                 |

## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|------------|--|-----------------------|
| A          | <p>SUGISAWA T ET AL: "MICROBIAL PRODUCTION OF 2-KETO-L-GULONIC ACID FROM L-SORBOSE AND D-SORBITOL BY GLUCONOBACTER MELANOGENUS"</p> <p>AGRICULTURAL AND BIOLOGICAL CHEMISTRY, JAPAN SOC. FOR BIOSCIENCE, BIOTECHNOLOGY AND AGROCHEM. TOKYO, JP, vol. 54, no. 5, May 1990 (1990-05), pages 1201-1209, XP002061325</p> <p>ISSN: 0002-1369</p> <p>cited in the application</p> <p>table 3</p> | 1-37                  |
| A          | <p>LEE H-W ET AL: "Screening for L-sorbose and L-sorbose dehydrogenase producing microbes for 2-keto-L-gulonic acid production"</p> <p>JOURNAL OF INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY, BASINGSTOKE, GB, vol. 23, no. 2, August 1999 (1999-08), pages 106-111, XP002241676</p> <p>ISSN: 1367-5435</p> <p>the whole document</p>   | 1-37                  |
| A          | <p>SHINJOH M ET AL: "Cloning and Nucleotide Sequencing of the Membrane-Bound L-Sorbose Dehydrogenase Gene of Acetobacter liquefaciens IFO 12258, and Its Expression in Gluconobacter oxydans"</p> <p>APPLIED AND ENVIRONMENTAL MICROBIOLOGY, WASHINGTON, DC, US, vol. 61, no. 2, February 1995 (1995-02), pages 413-420, XP002267229</p> <p>ISSN: 0099-2240</p> <p>table 1</p>             | 1-37                  |
| P,X        | <p>WO 03/104445 A (ROCHE VITAMINS AG; HOSHINO, TATSUO; MIYAZAKI, TARO; SUGISAWA, TERUhide) 18 December 2003 (2003-12-18)</p> <p>the whole document</p>   | 1-37                  |
| P,X        | <p>WO 2004/029269 A (DSM IP ASSETS B.V; HOSHINO, TATSUO; MIYAZAKI, TARO; SUGISAWA, TERUhide) 8 April 2004 (2004-04-08)</p> <p>the whole document</p>   | 1-37                  |
| P,X        | <p>WO 03/089634 A (ROCHE VITAMINS AG; HOSHINO, TATSUO; MIYAZAKI, TARO; SUGISAWA, TERUhide) 30 October 2003 (2003-10-30)</p> <p>the whole document</p>  | 1-37                  |
| P,X        | <p>WO 2004/029235 A (DSM IP ASSETS B.V; HOSHINO, TATSUO; MIYAZAKI, TARO; SUGISAWA, TERUhide) 8 April 2004 (2004-04-08)</p> <p>the whole document</p>   | 1-37                  |

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CH2004/000511

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-23 (completely); 24-37 (in part)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23 (completely); 24-37 (in part)

Isolated polynucleotide derivable from a polynucleotide encoding a polypeptide having L-sorbose dehydrogenase activity relating to SEQ ID NO 1. Partial sequences thereof. Polypeptide encoded by such a polynucleotide relating to SEQ ID NO 2. Partial sequences thereof. Expression vector and recombinant organism comprising such polynucleotide. Process for the production of L-ascorbic acid from a substrate selected from D-sorbitol, L-sorbose and L-sorbose using such a recombinant organism, a non-recombinant microorganism or such a polypeptide. Process for the production of L-sorbose dehydrogenase. Process for the production of vitamin C comprising converting a substrate into vitamin C in a medium comprising resting cells of a microorganism, limited to the microorganisms as described above (microorganism comprising a polypeptide relating to SEQ ID NO 2).

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2. claims: 24-37 (in part)

Process for the production of vitamin C comprising converting a substrate into vitamin C in a medium comprising resting cells of a microorganism, as far as not covered by invention 1.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

Internal application No  
PCT/CH2004/000511

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
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